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# Clean Development Mechanism (CDM)

## Challenges and Opportunities In the Rubber Sector

This study is a general analysis of the CDM challenges and opportunities in the rubber sector under the UNCTAD/IRSG/Earth Council CDM & Rubber Project. The study was conducted by EcoSecurities ([www.ecosecurities.com](http://www.ecosecurities.com)) under the UNCTAD/Earth Council Carbon Market Programme ([www.unctad.org/ghg](http://www.unctad.org/ghg)) with the support of the Common Fund for Commodities ([www.common-fund.org](http://www.common-fund.org)). The project is being coordinated by Mr. Gao Pronove, Executive Coordinator, Earth Council, Mr. Lucas Assuncao, Coordinator, Climate Change & BioTRADE Programmes, UNCTAD, and Dr. A.F.S. Budiman, Secretary-General, International Rubber Study Group (<http://www.rubberstudy.com/>).

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## Introduction

The natural rubber sector is an industry that may benefit from the international communities increased concern about greenhouse gas emissions. While significant portions of the synthetic rubber industry are positioned in industrial countries that will be impacted by Kyoto Protocol emissions caps (and consequent higher production costs), natural rubber production is centered entirely in developing countries that will not be similarly constrained. Moreover, emissions associated with natural rubber production are significantly less than its synthetic counterparts. Since natural rubber competes with synthetic rubber in many markets, any inherent cost advantage that can be obtained would seemingly be beneficial to the industry. The natural rubber industry can therefore expect that if emissions regimes continue to become more stringent, it will be the beneficiaries of product substitution, reversing a long-term trend in the sector.

A second area in which the emissions constrained environment may potentially benefit the natural rubber industry is via emissions trading. The emergence of the Kyoto Protocol's Clean Development Mechanism (CDM), a tool for financing sustainable development, has intrigued observers across a wide range of industries. Briefly put, the CDM will subsidize the use of more sustainable practices, as measured across the metric of relative GHG emissions. CDM projects are those that can quantitatively demonstrate that their relative GHG emissions are less than would be the case in a "business as usual" scenario.

For the rubber sector, there are a number of points in the production process that may – in theory – be able to benefit from the CDM tool. The most important at this juncture appears to be the potential to utilize biomass wastes to displace heating effects that are currently supplied by fossil fuels. Also in the waste arena is the potential to capture and destroy methane in the rubber production process. Methane is a highly potent greenhouse gas and in general projects that promise to impact methane emissions are highly sought after in this investment dynamic.

There is a third opportunity within the sector that is worthy of examination and consideration. Via the process of photosynthesis, the growth of rubber trees extracts carbon dioxide – the key greenhouse gas – from the atmosphere and locks it into that biomass in the form of sequestered carbon. Standing rubber plantations represent a large stock of standing biomass and therefore, sequestered carbon. If the world is strongly committed to tackling the emissions problem, that value could potentially be recognized and become a tradable asset, much as quantified emission reductions are becoming. Indeed, the UN Framework Convention on Climate Change and the Kyoto Protocol both specifically recognize the importance of sequestration and endorse the use of enhanced sequestration as a tool to mitigate climate change.

However, as the rules and guidelines of the CDM are currently set up, it is exceedingly difficult for tropical rubber plantation to claim this value and therefore participate in this market. This is unfortunate for natural rubber producers, because it likely represents the industry's largest physical potential within the emissions trading realm. While it is expected that policies will evolve over time, the firm conclusion at this juncture is that the vast majority of the current rubber estate will not qualify for benefits under emissions trading and that extension of the estate must occur under strictly defined conditions in order to qualify. These conditions are discussed later in this report. In instances where a producer does meet

the qualifications, it would clearly be advantageous to attempt to use the CDM tool to assist in financing those extensions. It is presumably in the sector's advantage to try to impact the rules and modalities of the CDM to be more advantageous to the sector in this regard.

The CDM is a business tool and developing CDM projects can be expected to cost proponents time and money. It is therefore incumbent on project developers to understand realistically which projects are likely to achieve trading status and pursue those with the highest likelihood and/or the greatest impact on project finance. While there are certain non-Kyoto markets for emission reduction that may be able to work with sequestration assets, these are highly irregular and difficult to pursue with any certainty. There are opportunities in the sector and these opportunities will likely grow as Kyoto becomes enshrined in industrial countries and more countries take on agreed emissions caps. The sector will benefit from this trend both indirectly – as certain competitors have new liabilities embedded in their production costs – and directly, as the emissions trading tool matures.

### ***Purpose of this Study***

To our knowledge, the rubber sector has yet to transact any CDM opportunities and few – if any projects concepts – have even moved into the position to be able to engage the market in an informed fashion. While as discussed above, there is some potential for achieving enhanced cash flows to the sector – and therefore enhancing competitiveness - the general sense is that few asset holders and developers are aware of the potential and the process involved. The development of projects as assets able to claim and transact emission reduction credits for the betterment of their balance sheets is an emerging market fraught with process requirements and complexities. A comparative minority of developers understands these processes and complexities. Moreover, the pricing, depth, liquidity and long term relevance of these emissions markets is a subject of considerable debate, as the Kyoto Protocol moves toward implementation throughout most of the world.

While these questions are in their own right worthy topic(s) for discussion, the document by and large assumes the existence of this market and that the processes required to create Certified Emission Reductions (CERs) under Kyoto are fairly finalized. We feel that this assumption can be justified – in late 2003 we can point to dozens of instances of clean energy projects tapping this market and there are numerous firms that assist firms in identifying, packaging and transacting these kinds of emissions assets using increasingly standardized processes.

This study is oriented at engaging the rubber sector in these new opportunities. Only by better understanding Clean Development Mechanisms and the impacts it could have on project or corporate finance in the sector, will rubber sector stakeholders begin actively analyzing their own asset base for potential emission trading opportunities. The document therefore represents a broad based first step to gaining that understanding.

### ***What is the Clean Development Mechanism?***

The Clean Development Mechanism (CDM) is one of three trading mechanisms established by the United Nations Framework Convention on Climate Change to meet the goals of the Kyoto Protocol. The Kyoto Protocol sets greenhouse gas (GHG) emissions limits for six

greenhouse gases for developed countries, mostly industrialized countries and economies in transition (mainly countries from Eastern Europe), known as “Annex 1 or Annex B” countries<sup>1</sup>. Under the Protocol, Annex 1 countries have a legally binding commitment to reduce their collective greenhouse gas emissions by at least 5% compared to 1990 levels by the period 2008-2012. Developing countries do not have specific emission limits during this first commitment period. As of July 2003, 111 parties have ratified the Protocol, and once Russia ratifies, which may happen by the end of 2003, the Protocol will officially enter into force.

Under the CDM, an investor from a developing country invests in a project that reduces greenhouse gas emissions and claims those reductions. After passing certain certification requirements, reductions in emissions convert into "credits" for the environmental benefit brought by the investment, and the value of the credit is shared between the investor and the project developer. The CDM has the potential to meet the needs of both developing and industrialized countries. It responds to the needs of Annex 1 nations by offering lower-cost, more flexible options in meeting emissions constraints, while providing a source of capital for the financing of clean, energy-efficient economic development and for projects with the potential to reduce deforestation and forest degradation in non-Annex 1 countries.

This transfer, or trade, is a market-based system that allows individual firms, as well as countries, to select the most cost-effective solutions to achieve GHG emissions reduction. It is also hoped that developing countries may find ways of sustainably using their natural resources. Project investments must contribute to the sustainable development of the non-Annex 1 host country and must also be independently certified. This latter requirement gives rise to the term “certified emissions reduction” or CERs, which is the specific output of CDM projects<sup>2</sup>.

The most important aspect of the CDM is that it operates as a business – it is not aid or development focused. It requires participating firms or organizations to engage appropriate risk management exercises in deciding their competitive advantages to enter this new market and evaluate their ability to enter into long term contracts to supply a new and novel commodity. While some firms will ultimately develop their own in-house capacity to manage the CDM development and execution process, it can be expected that for many other firms – particularly smaller ones that may engage only one or two CDM projects over the next several years, it will be more efficient to outsource to specialist firms in the market.

### ***What Kinds of Projects Qualify for the CDM***

By and large, when discussing the current breakdown of the CDM, we are talking about two types of projects – energy projects and fugitive methane projects. The variety of energy projects that are potentially appropriate for using the emissions trading tool is nearly endless. While much focus is placed on specific issues around renewable energy projects, emission mitigation assets can also be uncovered in fuel switching (coal to gas or coal to partial biomass, being the most popular) and energy efficiency projects, both at the production point

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<sup>1</sup> The term Annex I and Annex B countries are almost used interchangeably. However, strictly speaking Annex I refers to the 36 countries listed in Annex I of the UNFCCC. The Annex B countries are the 39 emissions-capped countries in Annex B to the Kyoto Protocol.

<sup>2</sup> A CER is the unit, typically equal to one ton of CO<sub>2</sub> equivalent that can be sold from a project activity approved and certified by the CDM Executive Board to buyers, an Annex 1 government or corporation for example.

(converting single cycle to combined cycle or CHP, for example) or at the end use upgrades (process efficiency on major energy consumption industries, such as aluminum and steel smelting). It is even theoretically possible that certain basic operational efficiency upgrades in carbon intensive jurisdictions such as China and Vietnam will be able to gain value from the carbon trading tool.

In renewable energy, transacted carbon projects have been undertaken in wind energy, low head hydropower (high head hydro with accompanying large reservoirs often produce significant fugitive methane from degrading biomass, limiting their effectiveness as emission reduction assets) waste biomass, dedicated biomass, solar power and fugitive methane projects. Fugitive methane encompasses a certain subset of project types, including landfill gas; anaerobic digestion of agricultural and/or municipal wastes and the use of methane vented from either active or retired subterranean coalmines.

Fugitive methane projects achieve the greatest so called “carbon efficiency”. This is because these projects generate significantly more ERs in proportion to installed assets. . For example, whereas in conventional energy projects (such as discussed above) the percentage of debt service provided by carbon can be up to 20% and current market levels (US\$4 per tonne of CO<sub>2</sub>e), which in itself is certainly significant. In methane projects, we have observed instances in which carbon values cover *greater than 100% of debt service requirements* and/or debt service capacity is demonstrably increased. Thus by monetizing emission reductions, ROE on methane projects improves explosively.

The reason for this is fairly simple, but worthy of brief explanation in that fugitive methane may have a significant role in the rubber sector. Due to the Global Warming Potential (GWP) of methane being 21 (meaning that 1 tonne of methane released into the atmosphere has the warming effect on the atmosphere as 21 tonnes of carbon dioxide) the capture and destruction of vented methane to the atmosphere is a high policy priority and represents the “low hanging fruit” of the carbon trading market. The simple act of capturing and combusting that methane (thereby creating one a little less than 1 tonne of CO<sub>2</sub> and some water) earns the developer some 20 tonnes of CO<sub>2</sub> reduced. On a power plant basis, it can be expected that 1 MW of base load power (8000 hours/year) fired by fugitive methane can earn some 25,000 to 40,000 CERs per year. This means a net bottom line benefit of *approximately US\$100,000 to \$200,000 per MW capacity* using recently reported emission trades as a benchmark for pricing.

While fugitive methane projects demonstrate tremendous carbon economics, size issues hamper them –globally there appear to be only several handfuls of projects with greater than 20 MW potential and the vast majority of projects appear to be at the sub 5MW range. Financing, off take agreements and EPC contracting are challenging at even larger levels and become extremely difficult as scale diminishes. Moreover, as with any part of project finance, the embedded costs of developing the carbon trading component of projects becomes more significant, as scale decreases. In short, despite the incredibly favorable economics that these projects represent on the surface, they are neither for the faint of heart, nor for those to whom aggressive and innovative financial structuring is a foreign concept.

## ***What are the Markets and How are Transactions Developed***

While it is expected that ultimately the market for emissions trading will be driven by private companies in the OECD (who will purchase qualified emission reduction to help meet regulatory requirements at home) as of mid-2003, the major purchasers in the market are coming from multilateral institutions and from government agencies. This is because while countries recognize their need to bring emissions into line with Kyoto targets, none to date have undertaken the politically contentious process of distributing emission “allowances” to their industrial concerns, a process that is expected to begin in earnest in Japan, Europe and Canada in 2004. Therefore, while individual companies in the private sector sit on the sidelines waiting to understand what their net emissions position will be (and therefore, how aggressive they will need to be in the emissions market), government and a series of development bank funds have taken up the task of priming the market with significant volumes of emissions purchases planned over the coming years.

As of mid-2003, there appears to be nearly US\$1 billion committed to emission purchases over the coming years. The largest fund manager is the World Bank Group, which manages the Prototype carbon Fund, the Netherlands Carbon Development Fund, the Community Development Carbon Fund and the forthcoming Bio-Carbon Fund for sequestration activities. On aggregate, these funds represent some half a billion dollars approximately. The next major source of carbon funds appears to be European governments, including the Netherlands (which has committed at least another \$250 million beyond that managed by the World Bank), while the Danish, Austrian and Canadian governments are all further developing emission purchase funds that will each be at least US\$100M. These will take a number of years to disburse and are actually quite small compared to the ultimate size of the carbon market, which is estimated to be at least US\$5 billion per year by 2010, with some estimates significantly higher than that.

Current pricing for quasi-CERs – the carbon commodity – has varied significantly, with the lower end prices just over US\$1 and with an upper range near US\$10. We call it a quasi-commodity at this juncture, because the final certification of the commodity by the CDM executive Board has not yet taken place, though it is expected that will occur before the end of 2003. The vast majority of contracts signed by either the World Bank or the Dutch government – by far the largest buyers - have been in the US\$3-5 per tonne range. It has been reported that smaller scale projects that demonstrate high levels of sustainability under the Community Development Carbon Fund will receive at least US\$6 per tonne.

It is a common conception among new participants in the market that emissions transactions involved upfront payments from purchasers in return for downstream returns of CERs. While this is a possible model, the far more common transaction has been that where purchasers pay on the delivery of CERs over a long time period (generally between 7-14 years) with prices set at the outset of the contract. The implication of this transaction model is that the developer is responsible for putting together the upfront finance for the project at the outset. This makes any project that is highly reliant on CER revenue for viability, extremely difficult to finance at this juncture. Few financial institutions are sufficiently sophisticated to evaluate the risks around banking a project based upon a long term Emission Reduction Purchase Agreement (ERPA, the common term for these types of contracts). This means that developers generally need to finance projects out of retained earnings or bring in outside equity. For projects that are less dependent on carbon revenue, it can be assumed that

conventional financing techniques are available and that any CER revenue will be primarily booked as upside in the *pro-formas*.

### ***What about Forests and Plantations in the CDM?***

For many rubber sector asset holders and developers, the key question in regards to emissions trading is whether the carbon sequestered biologically within large scale rubber plantations is transactable and could therefore be useful in developing financial structures to increase natural rubber production areas. The UN Framework Convention on Climate Change, the Kyoto Protocol and the Clean Development Mechanism all recognize the importance of natural sequestration as a tool against potential climate change and forests are clearly a significant component of natural carbon sequestration. It is therefore logical to ask whether the world recognizes the seemingly significant contribution made to the fight against global warming that is made by existing forestry assets and – more importantly – whether that recognition can easily translate into financial remuneration using the CDM tool.

Put most simply, the answer is “no” – existing assets simply will not be able to qualify, in that they do not meet the fundamental “additionality” test that is required of CDM projects. While forest and plantation expansion plans may be able to qualify, for practical purposes, it is extremely challenging to engage the market with biotic sequestration projects in the current environment. The political debates over the crediting guidelines over biotic sequestration continue to be an area of extreme debate and full rules and regulations for claiming forest sequestration credit has appears to be far from finalized in mid-2003. The market has observed these continued debates and has responded by virtually ignoring most sequestration projects until greater certainty can be accorded to that project class.

Activities specifically associated with the forestry sector are treated separately under the CDM, within the context of ‘Land Use, Land Use Change and Forestry’ or ‘LULUCF’. International climate change policy associated with LULUCF has had a controversial evolution and to date a number of key issues relating to the rules and regulations for inclusion of project-based activities remain unresolved. As a result of various decisions to date, only afforestation and reforestation activities are eligible for inclusion under the CDM. The definition of afforestation and reforestation is a function of when the land was last forest covered, meaning that the replanting of current plantation would be ineligible and the planting on areas that had been another forest type within a specific time period would also be similarly ineligible.

Nonetheless, afforestation and reforestation are the only relevant sequestration activities that offer opportunities to the rubber sector. The following bullet points summarize the key factors and opportunities that will determine the eligibility of potential CDM projects in the rubber sector.

- Activities must constitute a land use change from non-forest to forest
- The area being planted, must have been non-forest on December 31<sup>st</sup> 1989;
- Activities post 2000 are eligible for inclusion in the CDM, however, only new plantings will be considered as additional activities (even those that have been planted since 2000, will not be considered eligible unless undertaken with carbon sequestration as an explicit assumption.

It is possible to try and estimate the maximum area that could be used to implement CDM projects. To do this, the following information is needed:

- A breakdown of land use on 31<sup>st</sup> December 1989, including the number of hectares under the category ‘non-forest’ (
- A comparable set of data for today, showing which of those non-forest areas on 31<sup>st</sup> December 1989, remain as non-forest today.

By comparing the two dates it is possible to exclude those areas that have been cleared since the beginning of 1990 and would therefore not be eligible for CDM activities. This exercise was recently carried out by a team of researchers in Indonesia who calculated an approximate area of ‘Kyoto eligible’ land. However, the team experienced a number of problems in calculating this figure and ultimately did not find it so useful for determining the potential for CDM in Indonesia. This is because the value is generally very large and too crude to reflect realistic opportunities. Although it can be used to look into the prospect for CDM projects in the rubber sector, there are many other factors that play a more important role in influencing the opportunities available. Ultimately the analysis of eligibility of forest-based projects, including an assessment of additionality, will be undertaken on a project-by-project basis rather than on a countrywide level, and site specific information.

Before moving on to other components of how the CDM impacts the rubber sector, it is important to recognize that the state of play for the sequestration tool is still very much in flux. While it is clear that plantation groups – such as the stakeholders within this report - would strongly agree with the premise a larger forest base would only benefit to the global environment, there is also a significant contrary voice to that position that has consistently been influential. A number of NGO’s have been pushing for a further restriction on the eligibility of land use activities. For example, some members of CAN (Climate Action Network) have lobbied for the exclusion of exotic, monoculture plantations, and this position was even supported in the recent draft text submission to the Climate Convention’s Technical Committee by Norway. Even though this position does not appear to be shared by many other Parties, if it were to be adopted it would have severe implications on the eligibility of land use activities undertaken by the rubber sector, given that they mostly consist of using exotic species in a monoculture environment.

It is therefore vital that the policy advocates for the rubber sector (and the forest plantation sector generally) engage in this policy debate to attempt to create the widest possible opening for the biotic sequestration option. The so called “anti-sinks movement” is loud, demonstrative and organized and has traditionally made great headway in scaling back the use of sinks, in meeting the objectives of the Climate Convention. This debate has traditionally mixed science, policy and ideology and it will be an important point of engagement for the sector in moving forward in this component.

### ***Current Issues Around Developing Projects in Asia***

Much of the rubber industry is current centered in Asia and it is therefore appropriate to briefly review where the region stands in regards to developing structures for managing and regulating CDM projects. Relative to Latin America and South Africa (rapidly becoming a major CDM player), Asia is relatively behind in the development of CDM projects and the required governmental infrastructure to support them. Whereas Latin America pioneered the

concepts that eventually became the CDM during the Climate Convention negotiation process leading up the Kyoto Protocol, there has consistently been more reticence among most Asian governments in engaging the CDM as a tool and as a domestic policy process.

While the reasons for the gap are speculative and not appropriate for discussion in this forum, it can be said that there is an emerging CDM interest in the region and it can be expected that the gap will close. Given the population dynamics, projected energy demand and significant pressures in the region for better waste and air quality management, it would be surprising not to see the CDM ultimately be adopted with enthusiasm - at least among certain governments.

The engagement of governments must be considered a vital prerequisite for the CDM to flourish. Without defined and transparent process of how governments will approve projects for CDM trading, developers cannot know if they are able to financially assume any value from the CDM on their *pro-formas* and therefore move the commodity from the speculative to the bankable.

It is expected that a significant market for Asia credits will emerge from Japan, which will potentially seek co-investment equity and debt deals to accompany carbon transactions. However, it is telling that, to date, of the millions of dollars that Japanese firms have put into emissions transactions, the highest profile direct transactions have been with Brazil, Slovakia and Kazakhstan. The transaction portfolio of the World Bank's Prototype Carbon Fund - in which Japanese investors represent some 50% of the private capital - is almost entirely in Latin America with a small amount in Africa.

### ***Directions for the Rubber Sector***

Like many agricultural sectors, the rubber sector has several areas of pursuit in order to engage the CDM instrument. These are principally in the management of its biotic waste, principally to displace the current use of fossil fuels. There is also potential increasing efficiency of its processes that are reliant on fossil fuels and are not feedstock flexible. Lastly, as discussed above, any project that involves the capture of fugitive methane – such as would appear to be possible via the creation, capture and utilization of biogas in the production process – will enjoy by far the greatest economic benefit against capital costs. It should be expected that among the first successful projects would come from this sub-segment within the sector

It is expected that a significant percentage of CDM project opportunities in the natural rubber sector will be quite small in scale, which has certain advantages in that it enables project developers to use the Small Scale Project window that has been established by the CDM. This has certain advantages and certain disadvantages. The advantages are that small scale projects are allowed to use a set of simplified procedures to engage the carbon market. There are also reports of a certain buyers in the market who are aggressively pursuing smaller scale projects and paying premium prices for the emission reduction credits that emerge from them. This is countered, however, by the truism of any market – that smaller product providers will always have challenges in fighting for market share with larger producers. Secondly, even with reduced transaction costs, those costs are will often represent a more significant portion of the eventual cash flows from emission trades.

Compared to certain other sectors, the rubber sector is truly in its CDM infancy. As this study raises basic awareness within the sector, the next stage will be to identify promising project assets, undertake the analytic functions required of emissions trading and bring project concepts and emission trading opportunities to the market. This is planned for the second component of this initiative.

## **Section 2 - The CDM Process**

Developing CDM projects currently represents an expensive and time consuming process. Emission reductions represent little more than mathematical formula – one is making a claim of an environmental benefit that has occurred in lieu of an activity that never happened yet must be measured against. The activity that did not happen is referred to as the baseline and it represents the keystone of any successful emission reduction project. It is the responsibility of the developer – or specialists he retains – to develop a significant paper trail of documentation regarding this claim, as well as a number of supporting documents that are required by the CER creation process. Again, we emphasize that the CDM is a business and not a new form of development aid and counterparties to CDM transactions (the buyers of CERs) are using this commodity to meet their own regulatory requirements. Failure to meet the required standards will either mean that buyers will progress on to other sellers who are more reliable and can meet the standards of the industry. This section gives a brief overview of that process.

### ***Introduction to the CDM Stakeholders***

It is important to recognize that while CERs represent a new commodity, it is a non-physical commodity that relies on multiple levels of agreement between various stakeholders as to the accuracy of a particular claim and the appropriateness of a particular project. It is therefore highly dependent on the interplay of a range of stakeholders in the process. To briefly review these include'

- Project Developers
- CER Purchasers or Investors
- Designated operational Entities (Also known as 3<sup>rd</sup> Party Validators)
- Designated National Authorities (the local regulator)
- The CDM Executive Board
- The Methodology Panel of the CDM Executive Board

### **Project Developers:**

As discussed briefly in section one, the range of project types that are potentially eligible for the CDM is virtually boundless – only nuclear projects have been specifically prohibited in the first period of the CDM. In terms of organization type, virtually any type of organization can be the responsible party for development and submission of the documentation to the CDM Executive Board. The following types of organizations can submit CDM projects to the Executive Board:

- Governmental bodies (i.e. departments of government);
- Municipalities;
- Foundations;
- Financial institutions;
- Private sector companies; and
- NGOs

Organizations acting as an intermediary for any of the above organizations can also develop the application to the Executive Board, on behalf of the project sponsor. Most project developers are private sector companies since it is within this sector that trades occur and because CDM is a market mechanism based on business standards.

### **CDM Investors:**

An investor is an entity that purchases CERs from a CDM Project. The investor is usually from an Annex 1 country and can come from the government, a corporation or non-governmental organization. While there is often discussion about the CER commodity trading becoming liquid, global and traded on various exchanges, that day is not here yet. Whether that would give developers unconstrained access to the downstream markets is debatable.

In mid-2003, the CER commodity is generally transacted in long term purchase agreements multilateral organizations that manage carbon purchase funds on behalf of 3rd parties, including governments, major emitters and other interested parties. Managers of such funds include the World Bank, the International Finance Corporation, the Andean Development Bank, and the European Bank for Reconstruction and Development. There are also several private banks engaged in similar functions, notably RaboBank, CDC-Ixis and KfW at this juncture. There are also direct government CER purchase tenders from a series of European governments, led by the Netherlands. It is expected that both Canada and New Zealand may also follow this model.

While there is tremendous interest among private sector participants (i.e. major emitters seeking to meet emissions reduction requirements at home), direct transactions have slowed until there is better understanding among that class of participants of their exact position in the market. Few major emitters precisely understand their place in the market and what their responsibilities will be and most are therefore husbanding their resources awaiting greater certainty before committing resources. CER purchasers will tend to be sensitive principally to two variables – price, and delivery certainty. CERs are a compliance tool to meet local regulations on GHG emissions. For a purchaser to make a long-term purchase commitment and then experience seller under-performance could have significant financial implications on the purchaser, as he is then liable to replace those credits or perhaps pay hefty fines.

The term “investor” remains a bit of a misnomer, in that few purchasers of CERs actually invest in the project – rather, their commitment to long term purchases of CERs presumably enables the project proponents to raise capital from other sources with greater certainty and promising higher returns. There is – however – the potential model whereby a company seeking CDM credits may choose to obtain them in part by making direct equity investments into the project in question. While this has not been the model of most transactions to date, there appears to be growing interest in this model, particularly among those parties that may

be speculating in the value of the CERs, rather than seeking them strictly for compliance purposes.

### **Designated National Authorities (DNAs)**

The Marrakech Accords state that in order to participate in the CDM, a country needs to be a Party (signed and ratified) to the Kyoto Protocol. Although these requirements are not directed at project developers, developers should check the status of a host-country with regards to meeting eligibility criteria for the CDM. If a country did not ratify the Kyoto Protocol, projects within its borders will not be eligible under the CDM. The risk of starting a CDM project in a country that is not a Party to the Kyoto Protocol is borne by the *project developer*. Thus, it is strongly recommended to obtain some form of host-country approval or indication, which would state that the country under consideration has the intention to- or is preparing to - become a Kyoto party before continuing the cycle.

It can be assumed that the country is seriously interested in obtaining such status if it has:

- Set up, or is in the process of setting up, a CDM office;
- Been active in the AIJ pilot phase;
- Been providing national communications to the UNFCCC; and/or
- Appointed a national focal point for climate change.

It should be noted that ratification of the Protocol is not the only requirement for a country to be eligible for hosting CDM projects. In addition to the Protocol ratification, the CDM host countries have to assign a Designated National Authority for approving CDM projects and express willingness to voluntarily participate in the proposed CDM project activity. At of 2003, only several countries have formally nominated their DNAs – however, it appears that the process is accelerating as Kyoto markets become more mature.

The DNA is empowered to issue relevant endorsements and Host Nation Approvals (HNA) and manage the local regulatory aspects of the CDM. Specifically, the DNA has the final legal responsibility to approve the transfer of project related credits into the national system. It is the DNA's responsibility to ensure that individual projects meet the Host Nation's overall sustainable development objectives. It is therefore, also incumbent on the DNA to publicly specify any particular project types that it will not approve, so that project developers do not get overly enthused about non-translatable assets.

From the perspective of the UNFCCC, the DNA is essentially an individual, but in practice will be supported by a team of individuals aiming to manage the HNA process. The UNFCCC Web site (<http://unfccc.int/cdm/dna.html>) holds a list of those nations that have submitted to it the relevant details of their respective DNAs. Contact points for several DNAs or proto-DNA authorities in several major rubber producing countries are given later in this document.

### **Designated Operational Entities (OEs)**

Designated Operational Entities (OEs) are domestic or international legal entities that have been accredited by the CDM Executive Board. As noted by the current list given below, they tend to come from agencies that act as neutral observers in a variety of commercial circumstances, wither as corporate auditors and trade product quality certifiers principally. They are often referred to as

3<sup>rd</sup> Party Validators, in that they validate the documented claims, regarding the proposed emissions baseline according to standardized procedure. Operational Entities are supposed to be neutral – they are not advocates of the project. However, once an Operational Entity had validated the project, it can be expected that they will fully support the project's submission to the CDM Executive Board and will interact on the project's behalf with the EB and/or the Methodology Panel, as required.

The OEs are responsible for significant stages of the CDM Project Development Process. The responsibilities include:

- Validation of CDM activities before the inception of the project;
- Verification and Certification of CER after the inception of the project;
- Making publicly available CDM Project Development Documents
- Receiving public comments on the CDM Documents
- Incorporating Stakeholder comments
- Submission of an annual report to the Executive Board;

The following twelve organizations have qualified as accredited Operational Entities as of mid-2003. Additional information about them – and additions to their ranks - can be found at [www.unff.int/doe](http://www.unff.int/doe).

- Asahi and Co.
- BVQI Holdings Ltd.
- Det Norske Veritas Certification Ltd. (DNV Certification Ltd)
- ChuoAoyama PwC Research Institute Corporation (Formally, Chuo Sustainability Research Institute Co. Ltd. (CSRI))
- Japan Audit and Certification Organization for Environment and Quality
- Japan Consulting Institute (JCI)
- Japan Quality Assurance Organization (JQA)
- KPMG Certification B.V.
- PricewaterhouseCoopers Certification B.V.
- SGS UK Ltd. (SGS = Société Générale de Surveillance)
- The Korea Energy Management Corporation (Kemco)
- Tohmatsu Evaluation and Certification Organization (TECO)
- TÜV Anlagentechnik GmbH
- TÜV Süddeutschland Bau und Betrieb GmbH (TÜV Süddeutschland)

### **CDM Executive Board (EB)**

The CDM EB supervises the CDM and reports directly to the Conference of Parties (COP) and Meeting of Parties (MOP). The EB was elected at COP 7 and has 10 members representing a variety of countries. The EB is responsible for the following activities:

- Make recommendations to the COP/MOP on amendments as well as on further modalities and procedures for the CDM;
- Approve new methodologies related to baselines, monitoring plans and project boundaries;
- Review simplified procedures and definition of small-scale projects and report to COP/MOP;

- Be responsible for accreditation and suspension of Operational Entities;
- Operationalisation and review of accreditation procedures;
- Make publicly available proposed CDM activities and all procedures for developing a CDM project;
- Develop and maintain a CDM registry;
- Review project validation and verification reports; and
- Issue verified CERs

As the delineation of responsibilities of the EB clearly indicates, the EB represents the ultimate authority in the CDM process. Without EB approval, there simply are no emission credits and the likelihood of gaining any monetary value for environmental performance becomes quite negligible.

### **The Methodology Panel**

While the Methodology Panel is a function of the CDM Executive Board and reports to it (and has no direct power of its own) its function is worth noting, particularly in that projects in the rubber sector will almost certainly creak new ground. When projects in new sectors and using new technologies are brought forth for approval by the CDM EB, it is the job of the Methodology Panel to review and critique the framework around which the project proponents have made their case is their attempt to demonstrate emission reductions. Once a methodology is approved, follow on projects that basically use the same methods of calculation and that basically have the same physical, political or sociological parameters, are simply judged using the approved emission reduction calculation methodology.

It can be expected that one or more of the first projects from the Rubber Sector will need to negotiate the Methodology Panel.

### ***The CDM Project Cycle***

All projects that aim to trade under the CDM must meet the same criteria and complete the same steps. This process is commonly known as the CDM Project Cycle. At the first step, a project developer is determining whether they have a project eligible under the CDM and preparing required documentation. By the final step, a project developer is certifying and receiving the credits in a monetary form. Many of the steps of the cycle can be completed in tandem with other elements of project development, such as preparing a business plan and raising capital.

This section presents the steps of the project cycle and describes what must be completed for each. The steps are as follows:

- Project Identification
- Baseline Analysis
- Project Design Document (PDD)
- Host Country Acceptance
- Third Party Validation
- Registration
- Implementation and Monitoring

- Verification of Credits
- Certification and Issuance of Credits

## **Project Identification**

A potential CDM project can be identified by host country project developers, either private or an NGO, governments, international organizations or international investors. Throughout the remainder of this Manual the entity that identified the project is referred to as the *project developer*. Once identified, the project developer must ensure that the project is eligible under the CDM rules and meets the national development priorities; meaning will be supported by the host country. Considering that the CDM rules are still evolving, a conservative approach should be taken when assessing the eligibility of the project under CDM.

## **Baseline Analysis – Assessing Emission Reductions**

Once the project idea has passed the eligibility test, the next step is to prepare a baseline study. According to Article 6.1b and Article 12.5c of the Kyoto Protocol, CDM activities respectively have to ‘generate emission reductions that must be additional to any that would have occurred in the absence of the project activity’. The purpose of the Baseline Study is to provide a transparent picture of what would have happened without the proposed project, as well as providing information on the estimated project emissions.

The Baseline Study, which is a required component of the Project Design Document, consists of:

- Description of the project characteristics;
- Definition of the project boundaries;
- An emission baseline (i.e. a forecast under the “business as usual” scenario);
- An assessment of the project emissions;
- A calculation of emission reductions.

## **The Project Design Document (PDD)**

Once a project has passed the pre-qualification phase, a more detailed analysis of the project has to be carried out. This section outlines the information that has to be provided by a project developer in the *Project Design Document* (PDD) for CDM projects. Annex x provides a template of the latest PDD as posted on the UNFCCC website – [www.unfccc.int/cdm](http://www.unfccc.int/cdm).

The PDD forms the basis for project evaluation by Operational Entities (OEs). The following sections are to be included in the PDD:

- Project Description;
- Baselines Methodology and Assessment of Additionality;
- Crediting Period;
- Monitoring Plan;
- Environmental and Social Impacts;
- Stakeholder Comments on the project design;

## **Host Nation Acceptance**

As discussed above, the DNA of a particular country is responsible for accepting or rejecting any particular project for participation in the CDM. This acceptance will come in the form of a letter of endorsement from the DNA either to the project proponent, the OE or the CDM Executive Board itself. Without host nation acceptance, there simply is no possibility of gaining access to the CDM. It is therefore highly advisable that the DNA be contacted as early as possible in the process to assess the likelihood of gaining such acceptance and the steps that need to be taken to secure endorsement

## **3<sup>rd</sup> Party Validation**

Once the Project Design Document (PDD) has been completed, the public comments have been summarized in a report and the host country approval has been received, all documents have to be analyzed and approved by an OE. The project developer has to submit the following documents to the OE for validation:

- The PDD;
- The baseline methodology used;
- A report summarizing comments by local stakeholders and how these are taken into account in the project; and
- Confirmation from the host government that the project meets host country requirements, assists sustainable development and confirmation of approval of the project.

This implies that the OE will validate data on GHG emissions as well as data and assumptions made regarding technical, social, political, regulatory and economic impacts of the project activity, as included in the Project Design Document. The Marrakech Accords specifically require consultation at the international level of the CDM. The responsibility for managing this consultative process at the international level lies with the OE. This invitation for comments is required in addition to the invitation of local stakeholders prior to validation, which is the responsibility of the project developer

The tasks of the OE for the consultation procedure are

- Make the Project Design Document (PDD) publicly available to Parties, stakeholders and UNFCCC accredited observers.
- OE has to give the potential commentators 30 days, from the date from which the PDD is made publicly available, to provide such comments to them. After receiving the comments, the DOE should record any comments.
- OE should provide a report, which explains how the comments received have been accounted for.

Information obtained marked as proprietary or confidential does not have to be disclosed, unless this is required by applicable under the national law of the host country. The following information cannot be considered as proprietary or confidential:

- The determination of whether the emission reductions in anthropogenic emissions are additional;
- The description of the baseline methodology and its application;

- Information supporting an environmental impact assessment requirements.

Based on the comments provided the DOE will make a decision as to whether the project can be validated. For CDM, the Operational Entity should make the validation report publicly available upon transmission to the Executive Board, including a request for Registration.

## **Registration**

For CDM, registration of the project with the Executive Board implies the formal acceptance of the validated project as a CDM project activity. As indicated above, the request for registration of a CDM project is the responsibility of the Operational Entity (OE). The request for registration is submitted to the Executive Board by the OE in the form of a validation report and host country approval. The registration of the project with the Executive Board will be final after a maximum of 8 weeks after validation and the submission of projects to the Executive Board, unless a review is requested (see below). It is recommended to ask Operational Entity for a copy or confirmation of the validator's request for registration. After the project has been validated/determined and the validation/determination report has been made public by the Independent or Operational Entity, the donor and host country involved in the project, as well as members of the Executive Board can request a review of the proposed CDM activity.

The review by the EB must be related to issues associated with the validation requirements for CDM projects. Until the Supervisory Committee or the Executive Board has finalized the review the decision for validation/determination is not final and thus the project cannot be registered.

## **Implementation & Monitoring**

After the project has been registered and the project has been commissioned, the project can be implemented. From this moment on, the project developer monitor project performance, according to the procedures laid out in the validated/determined monitoring plan of the Project Design Document. Then, the monitoring results have to be submitted to an OE for verification and certification. The performance of the "business as usual scenario" or baseline does not have to be monitored during the period for which the baseline has been fixed and validated by an OE.

At minimum, technical project performance has to be monitored, including the project output and the related GHG emissions. In addition, environmental impacts and leakage effects of the project have to be monitored. Where possible it is recommended to carry out the monitoring as much as possible in accordance with existing monitoring activities. For example, link monitoring of a power generation project with activities related to sales of electricity. Based on the monitoring results, the GHG emission reductions resulting from the CDM project activity can be calculated and submitted for verification as CERs. This is for the specific time period for which the monitoring results are provided.

## **Verification**

Similar to the process of determination/validation, it is the responsibility of the project developer to arrange for verification and to contract an OE to carry out the verification process. Verification is the periodic review and ex-post determination of the monitored GHG emission reductions that have occurred as a result of the CDM project. There are no specific requirements as to how often GHG emission reductions should be monitored – however, the monitoring plan should include the frequency of the monitoring activities. Frequency of verification activities eventually take place is mainly a choice of the project developer, assuming it is acceptable to the OE and the EB.

The OE shall make the monitoring report publicly available and submit a verification report to the Executive Board.

## **Certification and Issuance of Credits**

Certification is the written assurance by an Operational Entity that during the specified time period, a project activity achieved the reductions in GHG emissions as stated and verified, in compliance with all relevant criteria. This process of certification is required for CDM projects. In contrast with arranging for validation/determination and verification, certification is the responsibility of the Operational Entity.

The certification report that has been set up by Operational Entity (OE) should consist of a request to the Executive Board to issue the amount of emission reductions that have been verified by the OE as CERs. When the Executive Board approves the issuance of CERs, the CDM registry administrator, working under the authority of the Executive Board, will take care of forwarding the CERs into the appropriate accounts. This includes, if applicable, the account for the share of proceeds, for administrative expenses and forwarding the remaining CERs to the project developer.

## ***Procedures for Small-Scale Projects***

It is our expectation that significant number of projects in the rubber sector will fall under the rubric of small scale projects. As set forth by the UNFCCC, *'small-scale CDM project activities shall follow the stages of the project cycle specified in the modalities and procedures for clean development mechanism contained in the annex to decision 17/CP.7. In order to reduce transaction costs modalities and procedures are simplified for small-scale CDM project activities, as follows'*:

1. Projects and project portfolios can be bundled at the following stages – project design document, validation, registration, monitoring, verification and certification. The size must remain within the small-scale boundaries
2. Reduced requirements for a project design document;
3. Simplified baseline methodologies;
4. Simplified monitoring plans and requirements; and
5. Same Operational Entity can undertake validation, verification and certification.

In order to use these simplified procedures a proposed project must meet the eligibility requirements (less than 15 MW, energy efficiency projects less than 15 GWh per year, and less than 15,000 tons CO<sub>2</sub> per year); not be a *de-bundled* component of a larger project, and conform to one of the project categories below:

### Eligible Small-Scale Project Categories

<b>TYPE 1: RENEWABLE ENERGY PROJECTS:</b>	<b>PRACTICAL EXAMPLES</b>
Electricity Generation by End-User	Solar Home Systems, solar water pumps, wind battery chargers, pico-hydro, combined heat and power.
Mechanical Energy for the User	Wind or solar powered pumps, water and wind mills.
Thermal Energy for the User	Solar thermal water heaters and dryers, solar cookers, biomass co-gen systems for heat and electricity.
Renewable Electricity Generation for Grid connection	PV, hydro, wave, wind, geothermal, and biomass supply that is fed to the Grid.
<b>TYPE 2: ENERGY EFFICIENCY (EE) IMPROVEMENTS PROJECTS</b>	
Supply Side EE Improvements – Transmission and Distribution	Upgrade of voltage on transmission line, expansion of a distribution system.
Supply Side EE Improvements – Generation	EE improvements of power stations and heating plants, co-generation.
Demand Side EE Programmes for Specific Technologies	Adoption of EE equipment – lamps, ballasts, refrigerators, motors, fans, A/C, appliances.
EE and Fuel Switching Measures for Industrial Facilities	Efficient motors, fuel switching, efficiency measures for industrial processes.
EE and Fuel Switching Measures for Buildings	Technical EE measures such as insulation and fuel switching (oil to gas).
<b>TYPE 3: OTHER PROJECT ACTIVITIES</b>	
Agriculture	NO INFORMATION YET
Switching Fossil Fuels	In existing generation applications.
Emission Reductions by Low-Greenhouse Emission Vehicles	
Methane Recovery and Avoidance	Methane from coal mines, agro-industries, landfills, wastewater treatment facilities.

If a project is not listed above, a new activity category or revision to a methodology can be prepared and submitted to the Executive Board for consideration. Although similar across activities, the simplified baseline methodologies are described by category

The project design document (PDD) for small-scale projects has been simplified. For some project categories a pre-defined baseline can be applied. Check the UNFCCC website to find out if such a baseline is applicable to the proposed project. When asked to demonstrate that the project is *additional*, and therefore not the baseline scenario, a list of possible choices is provided from which a selection can be made. The barriers that would have prevented the project from happening include:

- Investment barrier – a financially more viable project would have been selected that would emit more GHG;
- Technological barrier – a less advanced technology with lower risks would have been selected and led to higher emissions;
- Barrier due to prevailing practices – existing regulatory or (GHG) policy requirement would have led to selecting a technology that emits more; and
- Other barriers – up to the project developer but may include institutional barriers, limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb technologies – all of which lead to higher emissions.

For small-scale projects, the *project boundary* is limited to the physical project activity. If the project displaces energy supplied by external sources the project will earn CERs from those sources. The issue of *leakage* will only be considered for biomass projects. This is important in transport projects, in that leakage could be a significant issue

Lastly, a formula to calculate the emission reductions by source is provided under each project category. The formulas are mostly straight-forward. For example, the formula for a grid connected hydro project is the annual kWh generated multiplied by a provided emission coefficient for a modern diesel generating unit of relevant capacity.

The simplified methodologies for monitoring can be found under each project category. A solar home system project for example, is required to complete an annual check of all systems or a sample thereof to ensure that they are still operating, or if appropriate metering the electricity generation. An efficiency improvement at a power station is required to measure energy savings by calculating the energy content of the fuel used by the generating unit and the energy content of the electricity or steam produced by the unit. A standard emissions coefficient is also required.

The requirements of the monitoring plan within the simplified PDD are significantly reduced since it is not required to monitor emissions outside the project boundary.

### **Validation, Registration, Verification and Certification**

Once the PDD is completed it can be submitted to an Operational Entity for validation. The OE must verify the following:

- The participation requirements of the CDM modalities and procedures have been met;
- Comments from stakeholders have been invited and a summary provided;
- Environmental impacts, if required by host party, are included;
- Project will reduce emissions of GHG;
- Project fits within selected Project Category;
- Project conforms to all procedures NOT replaced by the simplified procedures.

The OE must still solicit comments over a 30 day period after which time the validation can be confirmed or denied. If approved, the OE shall register the project with the CDM Executive Board. The agreed to monitoring plan shall be executed and submitted to the OE, the same OE if desired, for verification and certification of CERs. Finally, the Executive Board will issue the verified CERs.

### ***CER Markets and Transaction Structure Review***

The carbon credit market, which includes the CDM, is characterized by having relatively few buyers, who have a range of motives for participation. The vast majority of the publicly known capital for purchasing emission reductions comes from various funds and multilateral buyers. As we move he major institutional buyers include;

- The World Bank Prototype Carbon Fund \$180M
- ERUPT/CERUPT \$200M
- The Netherlands Carbon Development Fund<sup>3</sup> \$140M
- International Finance Corporation \$50M
- The Andean Development Bank \$40-45M
- Community Development Carbon Fund \$100M (target)
- World Bank Bio-Carbon Fund \$100M (target)
- The European Development Bank (EBRD) \$60M
- The Asian Development Bank \$100M (unconfirmed)
- Government of Denmark \$80-125M
- Government of Canada \$100M
- Government of Austria \$60M
- RaboBank \$40M
- CDC—Ixis \$50M

Above and beyond these institutional buyers include an array of private sector buyers that are just entering into the marketplace. As different companies will participate in the market in different ways – for compliance, as financial speculators and as a combination of the two, we do not make any effort to estimate the potential project finance flows that may ultimately be available from these sources.

The two most influential institutional purchasers of carbon credits are the Prototype Carbon Fund of the IBRD (World Bank) and the Dutch ERUPT / CERUPT programs.

### **The Prototype Carbon Fund**

The Prototype Carbon Fund was established by the World Bank and has been capitalized at \$180 million. Investors include governments and private sector<sup>4</sup>. The fund invests in carbon projects that qualify under JI or the CDM. Main objectives of the fund are:

<sup>3</sup> A parallel fund managed by the PCF of \$35M per year for 5 years

<sup>4</sup> The current participants of the Fund include: Government of Canada, Government of Finland, Japan Bank for International Cooperation, Government of the Netherlands, Government of Norway, Government of Sweden and a range of private companies, which include: British Petroleum (UK), Chubu Electric Power Co. (Japan), Chugoku Electric Power Co. (Japan), Deutsche Bank (Germany), Electrabel (Belgium), Fortum (Finland), Gaz de France (France), Kyushu Electric Power Co.

- Financing and procurement of high quality emission reductions that qualify under the UNFCCC. The PCF will invest only in projects that produce identifiable carbon benefits and contribute to the sustainable development.
- Knowledge. PCF develops and ‘proliferates’ carbon-specific knowledge through experience in the development and financing of carbon projects. PCF aims to build an extensive knowledge base that can be shared with other market stakeholders.
- Build public/private partnerships. The PCF aims to build partnerships between the public and private sectors to address various risks posed by climate change.

The PCF has extensive project documentation requirements and screening process that mirrors the processes required for the CDM and JI protocols. This includes the independent certification and verification of emission reduction and extensive public consultation.

Increasing geographical diversity of PCF project portfolio is a key focus of PCF policy. While the share of Latin American CDM projects continues to grow, due to the fact that the LAC countries were active in early CDM activities giving them a competitive advantage and making them less risky, a balance is being established with East European and African projects. PCF also strives to finance technologically-diverse projects. The current emphasis is on attracting biomass, waste-to-energy and small hydro projects, which are more economically attractive and more appropriate for the CDM requirements.

In its projections, PCF intends to:

- Focus project development efforts on the small island states in the Pacific
- Continue project development discussions with China and Vietnam;
- Commit about \$25 million to purchasing CERs from the South-East Asia;
- Commit to large-scale transactions (in the magnitude of US\$8-15 million);
- Develop sectoral emissions reduction approaches in selected larger developing countries like Brazil, China, India, Mexico and South Africa. Sectors considered include waste management, bagasse cogeneration and gas flaring reduction. To this end, PCF intends to design simplified sector-specific project development methodologies and procedures;
- Include non-CO<sub>2</sub> greenhouse gases (in addition to methane) in its project portfolio. One example would be nitrous oxide projects, which could materialize from nitric acid manufacturing, or perfluorocarbon emissions from aluminum production; and
- Expand the portfolio of land-use change and forestry projects. PCF current portfolio in this area consists of two projects: the Brazil plantar project and the Romania afforestation project. In addition the Bank has created the forestry specific Bio-Carbon Fund (BCF) discussed below.

### **The Bio-Carbon Fund and Community Development Carbon Fund**

In 2002, the Carbon Finance Unit at the World Bank announced the intention to develop two new Carbon Investment Funds. Such funds aim to produce verified carbon reductions and a range of other sustainable development and environmental benefits. However, unlike the PCF, it is possible that these funds will invest in projects that are not fully compliant with the Kyoto Protocol.

The Bio-Carbon Fund (BCF) will initially seek US\$100 million in funding from a variety of governmental and private sector entities. The Fund will make investments in projects that

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(Japan), Mitsubishi Corporation (Japan), Mitsui & Co. (Japan), Norsk Hydro (Norway), RaboBank (the Netherlands), RWE (Germany), Shikoku Power Co. (Japan), Statoil (Norway) and Tohoku Electric Power Co. (Japan).

sequester carbon in forest and agro-ecosystems. Fund participants will receive emission reductions that have the potential to be recognized under emerging international, national and regional emissions trading programs. This includes, but is not limited to the CDM. As with the PCF, one of the key objectives of the BCF is to “learn by doing” and illustrate the potential of sequestration and land-use projects to deliver verified emission reductions and a wide range of social and environmental benefits.

Similar to the BCF, the Community Development Carbon Fund (CDCF) will seek to invest in projects that produce a range of sustainable development benefits not limited to the reduction of GHG emissions, particularly if those benefits apply to rural communities. However, the Fund will focus on projects that produce emission reductions from non-forestry or non-land-use sectors (i.e., the fund will not support carbon sequestration projects). The fund was officially launched at the 2002 World Conference on Sustainable Development in Johannesburg. Initial capitalization is planned to be US\$100 million drawn from public and private sources. Investors will receive emission reductions (CERs) that may be recognized under the emerging international, national and regional carbon markets.

## **ERUPT/CERUPT**

ERUPT/CERUPT are carbon project investment programs run by the Dutch Government and managed by Dutch Senter International ([www.senter.nl](http://www.senter.nl)), through which the Dutch Ministry of Economic Affairs buys the CERs. A consortium of private and public businesses and the Dutch Government fund both of these programs.

ERUPT focuses on potential JI investments – principally in Eastern Europe, while CERUPT focuses on financing CDM projects. There are a number of additional functional differences between ERUPT and CERUPT, which include:

- The minimum scope of carbon credits supplied during the term of the contract varies between the two investment schemes. The minimum scope of credits required for financing under the ERUPT scheme is set at 500,000 tCO<sub>2</sub>e, while for CERUPT it stands at 100,000 tCO<sub>2</sub>e. However, under both schemes interested parties are allowed to start several small projects in order to achieve the necessary emission reduction. At the same time, bundled smaller projects must come with a single (the same) Letter of Approval from the host-government. Therefore, such small projects must be implemented in the same country; and
- The proof of contribution made by the project to the sustainable development of the host country has a strong emphasis in CERUPT project assessments.

Both CERUPT and ERUPT programs are implemented on a tender basis, during which interested parties are invited to submit Expressions of Interest (EoI) over stipulated periods. From these EoIs the above-mentioned Senter International shortlists all final project financing candidates, after which these short-listed parties are invited to submit a detailed project proposal.

As with the PCF, the CERUPT aims to invest in high quality carbon projects that will comply with the CDM. A detailed and comprehensive project development and assessment process is applied, designed to meet the requirements of the CDM, including public consultation. CERUPT projects can be developed in the areas of energy efficiency, transportation, energy supply (including renewables and waste-to-energy), fuel substitution and other types of projects.

CERUPT will not invest in forestry-related carbon sequestration projects (such as afforestation and reforestation), but will consider all other types of projects, including “greenfield” biomass energy development.

## **Parallel Markets**

One of the features of the GHG market place has been the emergence of a number of markets parallel to the CDM. A number of market segments are continuing to develop and integrate, while additional parallel markets are speculated to appear in the long-term. These may or may not end up substantially impacting the growth of the formal CDM market.

- The development of a parallel US emissions reduction market. At present, the US is not a part of the international emissions trading market due to its withdrawal from the Kyoto Protocol in the spring 2001. However, a long-term change in the US policy position has been widely speculated. Given current US climate change policy, which does not recognize Kyoto regulations and standards, it is possible that in the future the CDM project eligibility criteria would need to be widened – i.e. to include a broader acceptance of forestry sequestration to accommodate the US interests, should the US join the CDM regime.
- The emergence of a “retail” market for emission reductions, whereby individuals, companies or other institutions take on the commitment to make their lifestyle or operations less GHG intensive. Organizations such as the Climate Neutral Network, Future Forests, Clean Air/Cool Planet and others and helping facilitate these types of transactions.

## ***Structuring and Contracting CDM Transactions***

CDM transactions are particularly challenging, as the counter-parties often bring with them extremely different business and cultural perspectives. Purchasers of CERs are often large, sophisticated multinationals with transactional experience. Conversely, sellers of CERs range from those same multinationals to local NGOs, with a virtually limitless variety of sizes and types of businesses in between. From the perspective of rubber stakeholders, it can be expected that larger percentage of project opportunities that cross its path will be from smaller, less financially strong sellers, and will therefore require a variety of contractual and project financing assistance tools.

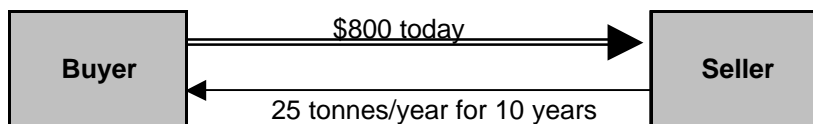
In order to successfully execute a CDM transaction, the buyer and seller need to reach agreement on (i) an appropriate structure for the transaction, and (ii) an appropriate contract for the transaction.

The structure of the transaction encompasses the timing of cash payments by the buyer and the timing of CER deliveries by the seller. The contract for the transaction encompasses the legal agreement that will protect both the buyer and seller from the risk of non-performance by the other party. It is appropriate to first examine the options available when structuring a transaction, as the structure will determine which provisions are required in the contract. The most common type of transaction structure is a forward payment at a fixed price meaning funds are only moved once delivery has been assured. This is obviously the most attractive for buyers because it drastically reduces their risk.

## Structuring Transactions

Several structures for transacting the environmental benefits under the CDM exist in the emerging carbon market. These are:

### 1. Upfront Payment for Future Stream of CERs

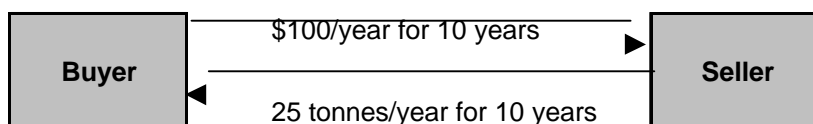


When projects to demonstrate efficient reductions in CO<sub>2</sub> were first discussed in the late 1980's and early 1990's, the overwhelming investment modality was one whereby purchasers of emission reductions would pay either the entire project cost, or the incremental improvement cost, at the *outset* of the project. Many of these projects were developed by local NGOs from developing countries, as many projects came from the World Resource Institute, which had relationships with many of these organizations. Also, a great number of the early projects were land conservation projects with high upfront acquisition costs and low ongoing operational costs.

Given the early-day rigid interpretations of "financial additionality" it was often inferred that CDM projects could claim to be additional (and therefore receive the benefits) only if it could be proven that the project simply could not have occurred without the participation of the investor entity. From the perspective of developers, this upfront investment model was obviously extremely attractive, in that money was invested in high-risk ventures with little - if any - direct financial liability attached and very rough guidelines of performance parameters to be met. As carbon credit value was not fully defined at either the domestic or international level, performance was delineated via bilateral contracts between sellers and buyer. Failure to perform was difficult to quantify as the environmental performance was not being determined in a compliance context.

As more credible purchasing counter-parties enter the market and as financial markets get used to the idea of set payment structures for environmental performance, it is likely that financial institutions (i.e. banks) will begin to get comfortable lending to carbon credit sellers based upon the value of their Emission Reduction Purchase Agreements (ERPAs) just as banks currently finance power generation facilities based on Power Purchase Agreements (PPAs). This will help bridge the divide between sellers desire for upfront capital with buyers risk aversion. From the perspective of developing country sellers, there is a strong potential in this path of market development, as it increases the percentage of hard currency in a domestic project financing

### 2. Forward Contract for Delivery of CERs at Fixed Prices



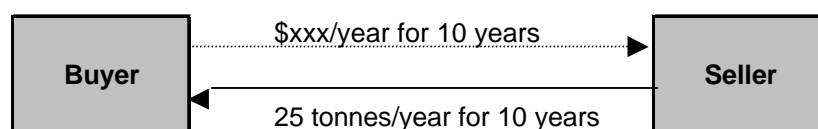
By far the most common structure for CDM transactions is the forward purchase agreement, whereby little - if any - cash transfers hands on contract signature, and where the price for delivery of CERs is set at the time of contract signature (and therefore these transactions are also referred to as "pay on delivery" structures). These forward delivery contracts range from one year to twenty

years, with a substantial number set at ten years. Most of the PCF and CERUPT projects are ten-year structures.

The forward contract structure requires the seller to deliver a specific number of CERs, or occasionally a range of CERs, with a minimum and maximum number per year. The buyer is required to pay a fixed price for the CERs, usually in US dollars or Euros. The fixed price will sometimes be structured to increase over time based on an inflation index or a pre-agreed step-up in price.

A complexity in a ten-year contract inevitably emerges if a project takes on a seven-year baseline with the baseline re-analysis for up to two more periods. If the contract structure ‘outlives’ the baseline, the seller is clearly at risk of affecting the price of achieved deliverables, if re-estimated baseline significantly changes in parameters. Hence, CER sellers are wise to insert contract clauses to ensure they are not penalized by recalculating baselines.

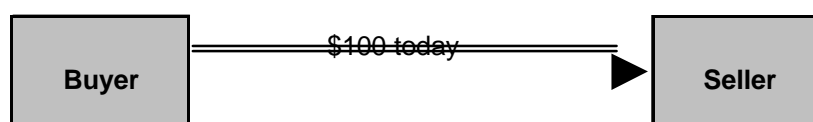
### 3. Forward Contract for Delivery of CERs at Floating Prices



A key issue in ‘pay on delivery’ contracts is whether forward prices for delivery are set firmly or are benchmarked to some outside parameter. A transaction structure with floating prices requires the seller to deliver a pre-determined volume of CERs each year, but the price paid by the buyer is reset each year based on an index.

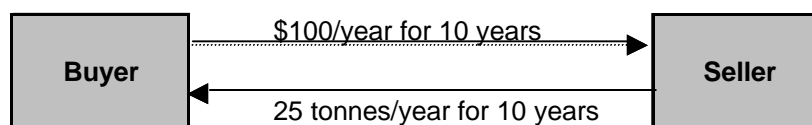
Given the immaturity of the CDM market, most buyers are insisting on fixed price contracts, as there is a general consensus that prices will increase in the future. As the limited number of buyers currently has greater negotiating power, the fixed price contract is currently the norm. However, while a floating price structure appears more attractive to sellers in a market where many participants assume that carbon prices will increase, it is not without substantial risks to sellers. Specifically, a floating price makes it much more difficult for the seller to plan their future cash flows, as the total payment to be received from the buyer will be uncertain every year. Furthermore, if there is an oversupply of credits in future markets and prices fall, the seller will receive much less than they currently anticipate, which could lead to the seller being unable to meet obligations on the project.

### 4. Option Payment for Future Delivery of CERs



Buyers occasionally wish to structure a transaction in which they purchase an option to buy a pre-determined number of CERs from the seller in the future, but are not obligated to purchase them until the option is exercised by the buyer. In an option structure, the buyer must pay the seller for the option today, in return for the right to exercise the option (i.e. inform the seller that the buyer wishes to enter into a contract to take delivery of the CERs) at a specific date in the future.

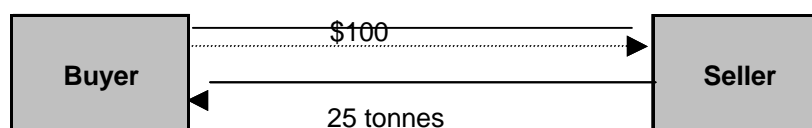
If buyer exercises their option, then:



The advantage to a buyer of an option structure is that it provides them with a great deal of flexibility. For example, if a buyer is concerned that they may need additional CERs in the future, but are uncertain of the amount they will need, they can use an option contract to prevent them from the risk of rising prices for CERs in the future. For sellers, an option structure provides them with an up-front payment, and may not require them to deliver CERs in the future. However, an option structure can create additional risk for the seller if they are unable to deliver CERs when the option is exercised by the buyer. Therefore, sellers are usually advised to enter into option structures only when they expect to have a large number of CERs to offer, and generally then offer options only on a small proportion of their total CERs. Also, while the premium may be a valuable source of immediate capital, the question remains about the degree to which a project can be forward-financed based on options, since there is no certainty that the option will be exercised. Several private sector, or corporate trades, has used the option structure however details regarding the deals are not public at this time.

#### 5. *Spot Market*

The spot market is the structure in which a seller delivers CERs from one year of emissions reductions in return for a one-time payment from the buyer. In this structure there is no forward commitment between the seller and buyer for additional delivery of CERs or payment, although there is nothing precluding the parties from a spot transaction from executing another spot transaction the following year.



The advantage of the spot market to both buyers and sellers is that it provides both parties with maximum flexibility for the future. However, the disadvantages for a seller include (i) the risk that they cannot find a buyer in subsequent years, and (ii) the risk that the price declines in the future. For the buyer there is significant risk that the price of CERs increases in subsequent years, as is currently predicted by many market analyses.

#### *Issues around Contracting Transactions*

The contracting of a CDM transaction is primarily designed to minimize the risk that the buyer or the seller does not perform on their obligations under the contract. In the current early stage of the CDM market, the buyers are almost all large, financially stable organizations, while the sellers range significantly in size and financial strength. Therefore, the contracts are mostly designed to protect the buyer from the risk that the seller does not perform as per the requirements of the contract. The contractual issues that most often arise and the common solutions are:

## **Delivery Risk**

In a fixed delivery contract, the seller presents to the buyer its ability to deliver set volumes of CERs at particular points of time in the future. The buyer has substantial risk if the seller fails to deliver the contracted CERs on time, resulting from (a) volume risk if the buyer cannot find replacement CERs in time, and (b) price risk if the buyer can only find replacement CERs at a higher price than in the current contract with the seller. Given the extreme volatility in the price of CERs, and the expectation that CER prices will increase in the future due to increased demand for high quality CERs, the price risk associated with non-delivery of CERs is very significant for buyers. Therefore, some buyers have contractually required substantial financial penalties (often several times the agreed purchase price from the same year) if sellers are unable to deliver CERs under the terms of the contract. This provides the seller with a significant incentive to deliver CERs on time. Thus, sellers have a financial incentive to take on delivery risk mitigation responsibilities. This is accomplished in the following ways:

- Committing only a percentage of a project's anticipated performance to a firm delivery contract;
- Cross-collateralising several projects into a pooled production portfolio;
- Purchasing delivery options from other producers – often combined with business interruption insurance to have the financial ability to exercise the options in a time of underperformance;
- Developing more formal insurance products (several financial institutions are currently developing such instruments through either using cash premiums or bundling many projects into a pool). However, it is expected that this kind of product will be useful only for industrial producers of CERs.

In current practice, on a project-by-project basis, sellers will often reserve 20% or more of the credits from each year's production into a non-delivery 'buffer'. In fact, buyers will often insist upon that type of buffering in the contract. As such, buyers will only forward contract for 80% (or less) of the expected delivery volumes, and the seller is prohibited from selling the additional CERs until they fill the buffer. This type of contract has a dual purpose: to help ensure that each year's commitments are readily achievable, and to build up a pool of carbon credits. This pool can be tapped in case of a project failure to produce credits for a significant period of time. If project performance is solidly maintained and confidence grows in the developer's ability to deliver carbon credits according to the contract, a seller with a banked credit pool is well positioned to make gains by participating in the carbon market. Over the medium or longer term, such position may result in an advantage if prices of CERs increase from their current US \$2-4/tonne price range.

## **Timing Risk**

Sellers face a risk that the CERs they create are sufficient in volume to fulfil the contract requirements, but that the timing of delivery varies from the contract dates. This can put the seller in a position of contractual non-compliance, thereby triggering severe financial penalties against the seller.

A mechanism that sellers can use to mitigate timing risk is the use of a multi-year delivery period. In this contract, the seller is allowed to spread out the delivery of CER's over a longer time period; for example, rather than being required to delivery 100,000 tonnes/year for 10 years, the seller is

required to deliver no less than 300,000 tonnes in any three year period, for a cumulative delivery of 1,000,000 tonnes over 10 years.

### **Counter-Party Credit Risk**

Buyers and sellers cannot enter into long-term contractual agreements if they believe that the counter-party carries with it a substantial credit risk. Counter-party risk has traditionally been considered in terms of assessing sellers. However, given the radical shifts in global commodity markets over the past years, it is fair to state that carbon sellers should also consider the risks inherent in engaging in long-term contracts with developed-economy buyers, particularly if they are using carbon transaction contracts as integral parts of the project finance process.

Counter-party risk for buyers is often significant because the sellers are located in developing countries. Credit committees in large corporations often have fairly rigid standards in regards to counter-party requirements. Given that a seller cannot have a higher credit rating than the country it is based in – and that many CDM countries have extremely poor credit rating -- this factor often presents an immediate hurdle to achieving an equitable carbon transaction. However, obstacle is mitigated if the contract stipulates annual delivery of certified credits (thus meaning that buyer has limited amount of financial exposure at any one period in time).

The traditional manner of addressing this kind of risk is via third party insurance, such as guarantees provided by export-import banks and the MIGA product from the World Bank Group. However, currently these facilities are not equipped to handle emission transactions, as there is no experience in assessing risk in these kinds of delivery contracts. Moreover, the types of insurance provided by international development institutions tend to be fairly narrow in that they only cover items such as political insurgencies and force- majeure events, rather than comprehensive guarantees.

### **Country Risk & Currency Risk**

Sellers of CERs are located in countries, which are generally considered to have significant country risk. As a result, corporate buyers are often concerned about entering into a contractual arrangement with a seller due to a perception of significant country risk. However, country risk is actually relatively low for buyers because most contracts are “pay on delivery”, in which the buyer is not obligated to make any payment until they have received verification from an independent party that the CERs have been created by the seller. The seller is also required to have host country approval for the sale of CERs, further limiting the country risk. Finally, participants in a CER transaction are almost never exposed to currency risk because the currency flows are always from a developed (i.e. hard currency) country to a CDM country, while the flow of CERs is not affected by currency rates.

### ***Transaction Costs***

Transaction costs are defined as costs incurred in order to complete a transaction. The concept of transaction costs is not specific to CDM or development projects, but rather affects any type of investment or trade. In economics theory, when the price of a commodity is at equilibrium it is equal to its marginal cost of production. However, in order to get the product from the producer to the consumer (buyer and seller) there will likely be additional costs such as legal or banking fees. Transaction costs do not include expenditures incurred for producing the goods, only those over

and beyond production costs. Nor does this economic theory address the issue over the risk associated with making capital and other resources available prior to securing the asset

Transaction costs will make the price of the product higher than the marginal cost of production, thereby reducing demand for the product by cutting out those that are too price sensitive. Transaction costs associated with the CDM can come from the project level, the multilateral level, and the national level.

Undertaking a project under the CDM framework will only be viable if the costs of transacting the CERs are substantially lower than the revenue they will generate. Transaction costs therefore particularly threaten project viability when the volume of CERs on offer is relatively low or when the price offered for reductions is very low. To expand, transaction costs that may make a project unviable if market clearing price is US\$2.50 a tonne, may be perfectly acceptable if the market price is \$7.50 per tonne. Worked examples below set out how transaction costs affect investment decision making. The table below presents an example of a carbon transaction consultant's cost for preparing a CDM project and is a realistic estimate based on experience in the field.

#### *Transaction Cost Estimates<sup>5</sup>*

<b>CDM Project Cycle</b>	<b>Carbon Transaction Consultant's Estimate of Cost (US \$)</b>
<b>A) Up-front (pre-operational) Costs</b>	
ER Feasibility Assessment	12,000 - 20,000
Monitoring & Verification Plan	5,000 - 20,000
Registration	10,000
Validation	10,000 - 15,000
Legal Work	20,000 – 25,000
<b>Total Up-front Costs:</b>	<b>57,000 – 90,000</b>
<b>B) Operational Phase Costs:</b>	
Sale of CERs	Success fee in region of 5 -10% of CER value. Higher for a small project than a large project.
Risk Mitigation <sup>6</sup>	1-3% of CER value yearly. Mitigation against loss of incremental ER value as a consequence of project r
Monitoring and Verification	\$3,000 – 15,000 per year <sup>7</sup> .

Again, the costs offered above are for a carbon consultant. According to representatives at the PCF and other buyers, they are currently incurring transaction costs of roughly US\$200,000 per project. This is directly related to the fact that each of the projects they assess is unique and represents a first-of-its-kind experience. It is also a function of the effort the PCF put into the projects they work with. It is expected that these costs will be reduced as the market evolves.

It is important to recognize the role of scalability in the individual transaction costs, as demonstrated in the following example. The CDM Executive Board has made efforts to reduce the transaction costs for small-scale projects, by introducing scaled registration costs and streamlined

<sup>5</sup> Source for all tables in this chapter: EcoSecurities

<sup>6</sup> Risk Mitigation Fees: the potential fee a developer may wish to incur so as to insure against non-delivery of contracted CERs. (This could take the form of a specific Insurance product, which are only now emerging)

<sup>7</sup> It is not clear yet exactly how the burden for monitoring and verification will be realized, costs will be incurred if on site verification is mandated, vs. remote verification for example

procedures. Unfortunately, these procedures have yet to be tested and to date there are very high fixed costs associated with baseline development, legal work, validation, and potentially verification, which cannot be scaled out. Therefore transaction costs as a whole have a high fixed cost element, and low variable cost component (with perhaps a 75%: 25% in such costs).

## **Malaysia Background**

Nearly 1.5 million hectares in Malaysia are dedicated to rubber production. One and a quarter million of the hectares are managed by smallholders and just under 200,000 by estates.

Biomass in Malaysia contributes about 14% of the approximately 340 million barrel of oil equivalent (boe) of energy used every year. There are five major sectors that contribute wastes to the biomass energy in Malaysia: oil palm cultivation, forestry (wood products), rubber cultivation, paddy cultivation, animal farming and urban waste. Some other sectors include coconut cultivation, cocoa cultivation and sugar cane cultivation.

The Malaysian Government has given biomass priority amongst the renewable energy options to be developed for extensive application in the country and is actively pursuing biomass power as its keystone renewable energy resource. SIRIM, with the cooperation and assistance rendered by the ASEAN-EC GOGEN Programme has been promoting the adoption of various proven and efficient biomass energy technologies in the industrial sectors. There are now eight Full Scale Demonstration Plants (FSDPs) successfully implemented using biomass as fuel to operate co generation. One using rice husk, five using the wood waste, one using palm oil waste and one using rubber waste.

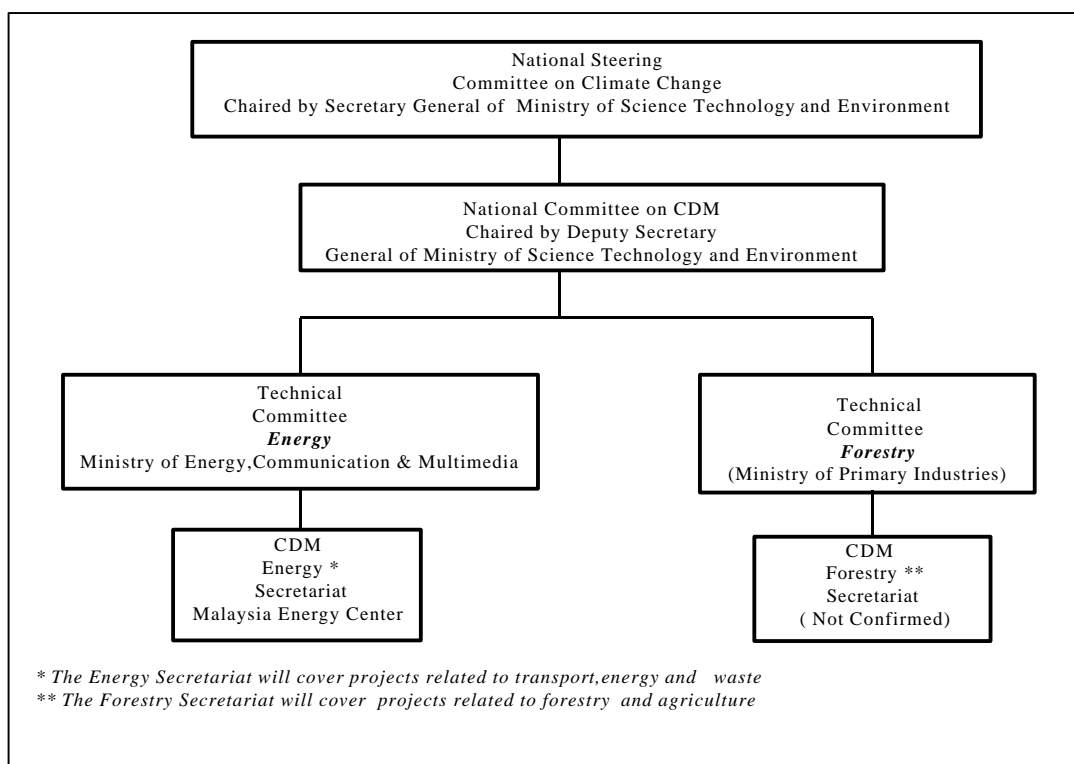
The rubber waste project is called Heavenfil Sdn. Bhd. In Batang Kali, Selangor. In the project, wastewater is treated in the anaerobic reactor. Biogas is produced from the biological process and used as fuel to produce hot thermal oil.

## ***Malaysia Kyoto Issues***

The government of Malaysia is a signatory to the UN Framework Convention on Climate Change (UNFCCC) and ratified the Kyoto Protocol in September 2002. Figure 1, below, provides an overview of the current Malaysian CDM institutional set-up. The National Steering Committee on Climate Change was set up in 1994 by the Cabinet and chaired by the Secretary General of the Ministry of Science, Technology and Environment. Members of this committee include the government, private sector and non-governmental organizations. Subsequently in May 2002, a national committee on CDM was formed to oversee the CDM. Establishing rules/procedures and capacity building are the initial priority of the CDM committee.

In August 2002, two technical committees were developed focusing on projects related to the energy and forestry sectors. The Secretariats for the Energy and Forestry Sectors are Pusat Tenaga Malaysia and Forest Research Institute of Malaysia respectively.

In July 2003, a methodology for a renewable energy project in the palm oil sector, Felda Lepar Hilil Mill located in East Malaysia, was submitted by an Operational Entity and approved by the CDM Methodology Panel. It is only the second approved methodology.



### ***Malaysia Energy Issues***

In Malaysia's Seventh Plan (Years 1996 to 2001), the Government's focus for the energy sector was on the sustainable development of non-renewable resources and the diversification of energy sources. From the policy to reduce the country's dependence on oil, there was a rapid development of natural gas. In the electricity sector, the main objective was to ensure adequate power generation capacity as well as the expansion and upgrade of the national transmission and distribution infrastructure. Furthermore, the development of new and alternative energy sources, as well as energy efficiency, was also encouraged. Utilization of renewable energy sources as a fifth fuel will be intensified during this 8<sup>th</sup> Plan to supplement the supply of energy from conventional sources. The government has targeted renewable energy resources to contribute 5% of the electricity generation for the national grid by the end of the Eight Malaysian Plan (8MP). This 5% target would equate to installing approximately 600-750MW of renewable energy by 2005.

The renewable energy resources that are prioritized include:

- Biomass
- Biogas
- Municipal Waste
- Solar
- Mini-Hydro

Biomass resources are intended for use on a wider scale for generating heat and electricity. Biomass cogeneration for the production of electricity and heat will be encouraged, particularly for on-site consumption. The export of excess energy generated by biomass-based systems to local

communities and to the national grid will also be encouraged, depending upon technical and commercial feasibility.

Fiscal incentives have been introduced to encourage the development of renewable energy in the form of tax and duty exemptions. It should be noted that to date, the incentives only apply to projects that involve the development of biomass power generation. However, it is likely that in due course the rules will also be applicable to generation of electricity from other renewable energy sources. Various fiscal incentives are provided in the annual 2002 and 2003 Budgets that assist in reducing operating costs

In parallel to the tax incentives, the government has also launched a programme to promote the use of renewable energy sources. The Small Renewable Energy Program (SREP) spearheads the implementation of Government's general policy of encouraging and intensifying the utilization of renewable energy for power generation. Under the SREP programme, small power generation plants that utilize renewable energy sources can apply to sell electricity to the utility (Tenaga Nasional Bhd. and Sabah Electricity Sdn. Bhd through the National Distribution Grid System. Project developers are required to negotiate directly with the relevant utility on all aspects relating to the Renewable Electricity Purchase Agreement (REPA).

The Government is particularly keen on the SREP leading to the development of renewable energy projects utilizing palm oil sector bio-wastes, which is also supported by a number of fiscal incentives. The Clean Development Mechanism may also offer significant sources of capital for in renewable projects, and the Government is currently implementing a framework to realize this value. The short to medium term prospects for the renewable energy market look promising.

The barriers to the implementation of renewable energy programme in Malaysia are not so much different from other countries. The major barriers are:

- Absence of effective complete government policy on renewable energy. This is still evolving.
- Some issues exist regarding legislation enabling the connection of renewable energy generated electricity to the national grid.
- Absence of financing for renewable energy projects. Banks have no experience of providing debt to small and medium sized renewable energy projects in Malaysia. This exacerbated by a restriction on foreign companies owning a maximum of 30% of any Malaysian company. Whilst SREP and the Clean Development Mechanism (CDM) offer significant levels of financial support, these are relatively recent initiatives, and in the case of the CDM national procedures are not in place.
- Absence of an established and well funded institutional framework for promoting renewable energy. As is the case in many countries the institutional framework is still evolving.
- Insufficient awareness on the potential of renewable energy.
- Resistance to change or inertia, because conventional energy is dominant and well established

Financing is still one of the major hurdles to exploit renewable energy investment opportunities. Local banks and financial institutions have yet to see the potential of renewable energy projects because of their lack of experiences with renewable projects. Financial institutions do not have any benchmarks to rely on when considering project risks and viability. However, with the recent government's announcement of the fiscal incentives in future budget would make renewable energy projects more attractive.

## ***Malaysia Land use Issues***

While Malaysia has significant land use assets that could potentially participate in the CDM, this has not been a country level priority to date. The palm oil sector and the forestry sector have both attempted to get these issues higher on the agenda for CDM – however, to date little progress has been made in Malaysia. Due to certain historical circumstance – among the first, controversial, prototype carbon trading projects were located in Sabah and were carried out without the sanction of the Federal Government – there appears to be a bias against land use project in Malaysia at this time. While this can be expected to change – particularly as Malaysia progresses in its economic development and perhaps moves away from CDM status, at this juncture there appears to be little political support for supporting land use CDM projects in Malaysia.

## **Indonesia**

Indonesia is the world's second largest producer of rubber behind Thailand. The majority of the rubber plantations, over 3.3 million hectares, are found on the islands of Sumatra and Kalimantan. It is estimated that roughly 12 million Indonesians rely on the rubber sector for their livelihoods. Of the 3 million hectares, over 2.7 million are owned by smallholders and only 600,000 by estates.

The majority of the rubber trees are managed by smallholdings (84%) rather than estate plantations. Therefore, the quality and quantity vary greatly and depend heavily on the farmers. The average smallholder produces about 670 kg per hectare per year, which is much less than the average estate production. According to the Director General of Plantations at the Ministry of Agriculture, Agus Pakpahan, Indonesia will rehabilitate 100,000 hectares of rubber plantation for four years starting in 2002. It is expected that reducing short-term output will increase prices. This is part of the strategy outlined under a pact made between Thailand and Malaysia signed in 1999. Indonesia will use the time it takes before the trees can be tapped, approximately 5 years, to build more rubber-intensive industries and expand production beyond latex and block rubber to include rubber wood products as well. As discussed in the section about land use regulations, there is potential that these planting will be eligible for the CDM, provided that they are undertaken on qualifying lands

## ***Indonesia Kyoto Issues***

The Government of Indonesia has signed and ratified the United Nations Framework Convention on Climate Change and is a signatory to the Kyoto Protocol since 1998. Indonesia anticipates ratifying the Protocol by the end of 2003 or early 2004. Meanwhile, the Ministry of the Environment was appointed as the national focal point in order to oversee and coordinate all climate change related activities<sup>8</sup> and a National Committee on Climate Change was formed in 1992 to more efficiently address the many issues related to climate change<sup>9</sup>. More recently, the German and Dutch governments have agreed to assist the Ministry to develop itself as the Designated National Authority, a requirement under the Kyoto Protocol<sup>10</sup>.

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<sup>8</sup> State Ministry for Environment, Republic of Indonesia, JL. D.I. Panjaitan KAV.24, Jakarta 12340, Indonesia <http://www.menlh.go.id>

<sup>9</sup> Information about the Committee can be found at [www.menlh.go.id/cc/coord/index](http://www.menlh.go.id/cc/coord/index).

<sup>10</sup> Contact people within the Ministry of Environment are Ir Gunardi ([irgunardi@hotmail.com](mailto:irgunardi@hotmail.com)) and Hendri Baiquni ([hbaiquni@hotmail.com](mailto:hbaiquni@hotmail.com)).

The Committee is divided into three working groups made up of representatives from various ministries and government agencies including the Meteorological and Geophysical Agency, Department of Health, Department of Trade and Industry, Department of Forestry, Department of Agriculture, National Aeronautical and Aerospace Institute, and University Friends of the Earth Indonesia. Its mission is to assist the Ministry of Environment by coordinating national policy, overseeing efforts to observe and evaluate the effects of climate change and coordination of information system development regarding climate change.

In order to assess institutional requirements, prioritize climate change activities and estimate the potential size of the CDM market in Indonesia, the World Bank and German Agency for Technical Cooperation (GTZ) initiated a National Strategy Study (NSS) to analyze both the energy and land use/forestry sectors. The energy study was first presented at the COP 6 in Bonn and is now available at the World Bank website – [www.worldbank.org](http://www.worldbank.org). The forestry study will be publicly available in 2003.

A Designated National Authority (DNA), as required under the CDM, will be established by Presidential Decree and comprised of two units – a national CDM Board and a national CDM Clearinghouse – both made up of various stakeholders within the Government. The Board would address institutional requirements under the CDM and the Clearinghouse would provide the support activities, such as capacity building and operational activities, including:

- Implementation of the CDM should highlight the role of the private sector and NGOs and limit the role of the government and institutional actors;
- Pursue the pipeline of projects identified during the NSS study including the following types of projects:
  - Energy efficiency in industrial and commercial sectors
  - Fuel switching projects in the National Grid
  - Mini hydro power
  - Utilization of flared gas.
- Ensure efficient process for small-scale projects
- Develop effective sustainable development priorities

### ***Indonesia Energy issues***

Indonesia is a significant player in the world energy markets due to its OPEC membership and ranking as the largest exporter of liquefied natural gas (LNG). It can be expected that these exports will benefit, as countries that face carbon constraints move to lower carbon fuels such as gas. According to the Energy Information Administration at the US Department of Energy, as of 2002, Indonesia has installed electrical generating capacity estimated at 21.4 gigawatts. The capacity sources are 84% thermal (oil, gas, and coal), 14% hydropower, and 2% geothermal.

The Asian financial crisis severely affected the state utility's - Perusahaan Listrik Negara (PLN) - plans to grow the energy sector through contracts with Independent Power Producers (IPPs). PLN has over \$5 billion in debt, which has grown markedly in terms of local currency due to the decline in the value of the rupiah. The Indonesian government has been unwilling to take over the commercial debts of PLN, however has increased tariffs that should reduce some of PLN's debt. Many foreign investors pulled out of their contracts and even abandoned half-built projects and the government is considering privatizing PLN's generation assets. PLN is warning that the country's power surplus could turn to deficit again within the next few years, but thus far, there has been little interest on the part of foreign investors in new IPP projects. Entering into power purchase contracts

with PLN may be deemed a significant risk by financiers, meaning that CDM projects in that sector will be accordingly more difficult to finance

### ***Indonesia Land Use Issues***

Indonesia will play an important role in land use related CDM activities since it boasts the third largest forested area in the world. The government has been very active in negotiations and discussions regarding land use, land use change and forestry (LULUCF) activities within the CDM. In November 2002, a paper was submitted by the Ministry of Environment to the UNFCCC Secretariat outlining Indonesia's position. The paper, "Definition of Forest, Modalities, and related aspect", can be found on the UNFCCC website at [www.unfccc.int](http://www.unfccc.int). A technical team has also been formed in the Ministry of Forest<sup>11</sup>.

Between 1984 and 1998, forests in Indonesia were destroyed at the rate of 1.6 million hectares per year. It is expected that this figure will significantly increase, perhaps well over 2 million hectares per year, due to the financial crisis. This figure would make Indonesia the country with the highest rate of deforestation in the world<sup>12</sup>. By 1997, Indonesia had lost 72 percent of its primary forest and 54 percent of the remaining was considered threatened. Degraded land or forest in Indonesia could make up 30 million hectares in total<sup>13</sup>. It can be expected that a significant portion of this land area may potentially be Kyoto-eligible.

Indonesia is presently completing a two year National Strategy Study for the land use sector, which has investigated the implications of the CDM and identified a portfolio of potential projects. The study followed the completion of a similar study for the energy sector, and has resulted in a great deal of discussion being undertaken at the national level on the issue of carbon forestry. The report is presently being finalized for approval by the World Bank. Analyses completed as part of the NSS indicate which projects are more attractive based on energy potential and marginal abatement costs. This information is summarized in the following table:

<b>Technology</b>	<b>Current Situation</b>	<b>Potential</b>
Cogeneration	Very limited use in Industries	Expected to increase, especially in pulp and paper, sugar and textile industries.
Solar thermal water heaters	Less than 1% of all water heaters	Expected to increase to over 6% by 2025.
Hydropower		National micro potential is 0.460 GW and large is 75 GW.
Gas Combined Cycle	Over 2.5 GW currently	Over 5 GW
Geothermal	0.80 GW	Unproven potential over 20 GW – estimated installed capacity over 5 GW by 2025.

The Indonesian delegation do not appear to have submitted any text for the forthcoming SBSTA meeting on methodologies and modalities for afforestation and reforestation in the CDM (UNFCCC website), but it is EcoSecurities understanding, based on informal discussions with delegates, that

<sup>11</sup> The contact people for the team are Sunaryo ([sunaryo@dephut.cbn.net.id](mailto:sunaryo@dephut.cbn.net.id)) and Agus Sarsito ([agussar@dephut.cbn.net.id](mailto:agussar@dephut.cbn.net.id)).

<sup>12</sup> CDM Forestry in Indonesia. Wisnu Rusmanto

<sup>13</sup> CDM Agroforestry Project and SD. Rizaldi Boer

there is support for the development of projects in the land use sector. In particular, there has been support for the development of simplified procedures for small scale projects and the potential shifting of the base year for reforestation to 1990. Note that this opinion is not based on official positions by the Indonesian Government, but speculations based on EcoSecurities understanding.

### **Conclusions**

It would appear that Malaysia and Indonesia are progressing on divergent paths in regards to their projected participation in the CDM. Whereas Malaysia remains highly skeptical about land-use projects and has not even formally developed a process for engaging that sector, Indonesia is far more willing to push forward with land use projects that meet the countries strategic and sustainable development objectives. Rubber stakeholders in these two countries would be advised to take these differences into consideration when choosing particular project types to engage.

## **Project Examples**

### ***Biogas Project in Thailand***

Khorat Waste to Energy Project (KWTE) is located in Khorat, Thailand. This proposed wastewater-to-energy plant [Anaerobic Baffled Reactor, or 'ABR'] will treat a local Cassava's wastewater and in the process capture, in the ABR, the Biogas generated by natural anaerobic digestion process. This Biogas will (i) be delivered to SWI as a substitute for its consumption of light fuel oil (LFO), and (ii) be converted into electricity through combustion in gas fueled electricity generator units. The electricity thus generated will be used as a substitute for grid-supplied electricity. CleanTHAI and its lead engineering firm, Waste Solutions Ltd., ['WSL'] forecast that the proposed ABR will capture a minimum of 70,000 cubic meters of Biogas daily, equivalent to 45,000 cubic meters of Methane Gas daily, and that through direct combustion of Biogas as a LFO substitute and through conversion of Biogas into electricity, will be able to substitute for 100% of SWI's LFO purchases annually and for more than 30,000,000 units of electricity [kWh] presently purchased from the grid each year.

The project is expected to deliver more than 400,000 tones of CERs per year, via the capture of fugitive methane, the displacement of fuel oil in the current plant and the displacement of grid electricity. The project has entered into a Letter of Intent with the International Finance Corporation for a multimillion tonne purchase on behalf of the Dutch Government. The remainder will be sold to other parties on a spot market basis

An Anaerobic Baffled Reactor [ABR] is an advanced version of the BioDigester with the longest and most successful track record – the Covered Lagoon Digester. The ABR will convert more than 90% of the wastewater influent organic load into BioGas. The BioGas will consist of an average 67-69% Methane Gas (CH<sub>4</sub>), 30-32% Carbon Dioxide Gas (CO<sub>2</sub>) and less than 1% trace gases such as Nitrogen (N) and Hydrogen Sulfide Gas (H<sub>2</sub>S). The H<sub>2</sub>S concentration of the BioGas will be an estimated 400 ppm or less. BioGas production will be relatively constant. Temperature variability inside the slurry in the ABR will be limited as a result of (i) the insulated nature of this in-ground BioDigester, and (ii) the lack of significant ambient temperature variability in Central Thailand.

### ***Biomass Waste Project in Malaysia***

Felda Palm Industries are proposing to use the waste product from crude palm oil (CPO) production, empty fruit bunches (EFB), for electricity and steam generation. The biomass plant will displace current diesel usage for electricity and steam production. The proposed site is vacant land sited within Bandar Sahabat taking in an area of 2 hectares. The project involves the construction of a 7 MW turbine generator equipped with auxiliary facilities such as boilers, water demineralization plant, cooling tower, air pollution control devices and EFB storage yard. Currently stand-alone diesel generators, owned and operated by the mills themselves or through Felda Engineering Services and Sahabat Bulklers, supply the power generated for industrial and domestic use at the Sahabat Complex.

Felda Palm Industries (FPI) is a member of the Felda group of companies. The Felda Group is quasi-government organizations acting as independent operational entities with a co-operative working relationship. Felda own and manage 10 mills in the Sahabat region of Sabah, the Easternmost Malaysian state, on the island of Borneo. These mills were developed in the 1980's and 1990's. The Sahabat Complex mills process full fruit bunches (FFB) to produce crude palm oil (CPO) leaving behind empty fruit bunches (EFB) as waste material and other palm oil wastes (such as the crushed palm nut and kernel shells). The latter waste is utilized on-site to ensure mill sites are self sufficient in energy. The CPO produced in the 10 Sahabat mills is then transported to a central CPO refinery where it is refined into a variety of palm oil products. The oil produced has a range of different materials in it that are refined into separate fractions for use as different products.

The Sahabat complex generates large quantities of EFB, over half a million tonnes per year. Currently the EFB poses a disposal problem as most of the Sahabat oil mills do not have an incinerator (sites built after 1992 are not allowed by law to use incineration as a waste management option). Consequently, on many sites the EFB has to be mulched. During the peak crop months, the EFB becomes difficult to manage at several of the mills- factors such as access to labour and land topography conspire against mulching as a cost effective option. Waste is then disposed of in some mills' undersized dumping sites, and degrades anaerobically. This practice occurs at several of the mill sites.

The baseline scenario is what would have happened in the absence of the project activities. In this case the baseline scenario is the continued use of diesel generation to provide both electricity and steam to industrial, commercial and residential consumers within the Sahabat complex. The project will displace the use of diesel for electricity and steam generation with a carbon neutral alternative, use of Empty Fruit Bunches. The project will result in some emissions including road emissions from transportation of EFB from the mills to the project site, and the use of diesel generators during a 2-week annual maintenance period.

There is also the potential for methane mitigation emission reductions if Felda reviews its project fuel supply arrangements to divert EFB from landfill. This is current practice at several mills without recourse to alternative cost effective waste management methods of incineration and/or mulching. These potential emission reductions have not been included in the estimation below but it is recommended that Felda Palm Industries consider this option to further reduce GHG emissions, and potentially increase the CER value of the project.

The Felda Palm Industries Palm Oil Empty Fruit Bunch Biomass project has the capacity to generate emission reductions of 517,795 tonnes of CO<sub>2</sub>e over its 10-year crediting period. These reductions, at an estimated US\$3 per tonne of carbon dioxide, could be worth US\$1,553,385 over the baseline-crediting period.

The project appears to fulfill all the eligibility criteria of the FCCC and the Kyoto Protocol, while at the same time conforming to international expectations in relation to the CDM and sustainable development objectives. It is assumed that international expectations will probably be similar to the requirements of the Malaysian Government, but details are not available at this stage. This project would be the first CDM project undertaken in Malaysia and could have significant capacity building benefits and enable similar projects to be replicated across the entire region.

Because of the various regulatory requirements, the development of a CDM project necessarily has to follow a certain order. The next steps of the project include development of a monitoring plan,

formal stakeholder consultation, and a letter of approval from the Malaysian Government and validation by and Operational Entity.

### ***Biogas Project in Nicaragua***

Compañía Licorera de Nicaragua is offering CO<sub>2</sub> emissions reductions to investors, which are expected to amount up to 626,875 over the first crediting period (7 years). The CLNSA anaerobic digestion project has the capacity to generate emission reductions of 2.37 million Tonnes of CO<sub>2</sub> equivalent over its 21-year lifetime. The project is in the GHG purchase pipeline of CAF, the Andean Development Bank, working on behalf of the Government of the Netherlands

The distillery plant is located in the city of Chichigalpa, 120 kilometres away from the capital city Managua. The project consists of four biodigestors for the anaerobic treatment of the wastewater generated in the production of alcohol from sugar molasses, reducing what are now uncontrolled methane emissions. The methane generated from the anaerobic treatment of the wastewater will be captured and combusted to produce energy. This energy will substitute the consumption of fuel oil and electricity used in the alcohol production process (in the storing of molasses, the fermentation process, the distillation process and bottling). The project will allow self-sufficiency in energy production. It is not projected that electricity will be generated to allow export to the grid.

The mitigation potential of the project arises from the capture of methane, which is currently emitted from a settlement pond for six months of the year, and from the displacement of fuel oil and grid-fed electricity by combusting methane to produce energy. The cogeneration unit installed in will have a capacity of 2.5 MW and a plant factor 98 percent - enough to offset all electricity consumed from the grid.

Anaerobic digestion is the bacterial fermentation of organic material. This produces biogas that is typically made up of 65 percent methane and 35 percent carbon dioxide, with traces of nitrogen, sulphur compounds, volatile organic compounds and ammonia. Typically, between 40 to 60 percent of the organic matter present is converted to biogas. The remainder consists of an odour-free residue that has the potential as a soil conditioner and fertiliser. The anaerobic digestion technology proposed for the project is the Upflow Anaerobic Contact (UAC) technology. This has a separate sludge separator, suitable for wastewater with high solids content.

The biogas passes to burners where the methane is converted to energy. In cases where the boilers fail, an atmospheric flare burns the methane, so that at no point is methane released to the atmosphere.

### ***Landfill Gas project In Brazil***

The objective of the NovaGerar project is to reduce methane (and CO<sub>2</sub>) emissions from the Marambaia and Adrianopolis landfills in the state of Rio de Janeiro, Brazil. This will involve investing in a gas collection system and a modular electricity generation plant (with final capacity of 20 MW), in order to capture the landfill methane, use it to generate electricity to supply to the grid and reduce emissions of 17.3 million tonnes of CO<sub>2</sub> over the next 20 years. Collection and combustion of the landfill gas (and therefore methane) to generate electricity will effectively result

in the avoidance of approximately 800,000 tonnes of CO<sub>2</sub> emissions each year, and grid electricity displacement will result in emission reductions of about 35,000 tCO<sub>2</sub> each year. A social program will be initiated in parallel, which will be based on the electrification of public buildings using electricity donated by the project. The project has entered into a carbon purchase agreement with the Prototype Carbon Fund for some 5M tonnes. The remainder will be sold to other buyers.

The gas collection system for Marambaia and Adrianopolis will use state-of-the-art technology, and will be designed by specialist landfill gas engineers. This includes landfill cells coated with an impermeable high-density polyethylene membrane, water residues channeled and treated in a state-of-the-art wastewater treatment plant, vertical wells used to extract gas, optimal well spacing for maximum gas collection whilst minimizing costs, gas headers designed as a looping system in order to allow for partial or total loss of header function in one direction without losing gas system functionality, and condensate extraction and storage systems designed at strategic low points throughout the gas system. All efforts will be made to minimize condensate management. A schematic of the gas collection system is shown below.

The electricity generation plant will be a modular plant design. Given the inherent uncertainty of gas supply, the smaller modular reciprocating engine generator units offer a significant advantage to adapt the equipment to the site-specific gas volumes. This is because it allows for a small pilot plant to be established at a relatively low cost and then, if economics and gas volumes support it, a plant expansion can be accomplished with minimal difficulty. Furthermore, as the gas volumes decrease over time, the modules can be relocated to other sites

### ***Geothermal in Kenya***

The Olkaria III geothermal project consists of two phases. Phase I, a tester phase, involved the construction of a 12 MW plant (recently increased to 13MW). Phase II is the expansion of the plant to 51 MW, an expansion of 38 MW. Binary combined cycle, a proprietary technology, is used for Phase I. Olkaria III is located on the southern side of Lake Naivasha, in the Rift Valley Province of Kenya. It is located partly within the Hell's Gate National Park, which was gazetted in 1984. Electricity will be sold to the Kenya Power and Lighting Company (KPLC), Kenya's electricity distributor under a 20 year PPA. ORMAT utilizes a proprietary technology that fully utilizes geothermal steam resources to generate power. The company has pioneered the development of using large numbers of smaller modular turbines on projects for rapid development and scalability without sacrificing efficiency.

Binary power plants are, by design, closed loop systems that inject all produced fluids, including CO<sub>2</sub> and hydrogen sulphide gases. An Ormat Energy Converter (OEC) contains a turbine, generator, vaporizer, preheater, condensing pipes and injection pumps. Phase I of Olkaria III has three such OECs. Dry steam from the reservoir is vaporised and expanded, powering a steam turbine, before being condensed. The expected investment starting date is the first half of 2003, and the expected construction starting date is first half 2003. The expected constructing finishing date is the first of 2005. The expected first period of delivery is expected to be the first half of 2005. Estimated emission reductions are some 260,000 tonnes per year (based upon displaced fossil fuel based generation). A LoI for a significant portion of the offtake is under discussion with the Prototype Carbon Fund and other potential buyers.

### ***Biomass Based Energy In Brazil***

V & M do Brasil is a joint venture between the German company Mannesmannröhren-Werke (45%) and the French Vallourec (55%). Created in October 1999, the joint venture incorporated Mannesmann do Brasil, a Brazilian subsidiary of Mannesmann, a manufacturer of seamless steel tubes. As part of the steel production process, large quantities of thermo-reduction agents are used. Internationally, the main source of reduction agents is coke, obtained from coal mining. V&M Tubes, however, will use sustainably produced charcoal for this industrial process, avoiding having to import coal. Charcoal is produced by its forestry subsidiary, V&M Florestal, that owns 130,000 hectares of FSC-certified plantation forests in the Minas Gerais state. V&M Tubes Florestal harvests about 17,000 hectares every year, to produce over 1,200,000 m<sup>3</sup> of charcoal, employing 2,300 people.

Recent economic trends related to both the industrial operations and the forestry sector has made the utilization of imported coal much more cost effective than the use of locally produced charcoal. This, in turn, has led a series of Brazilian steel manufacturers to move away from charcoal back to coal, leading to a substantial increase in GHG emissions to the atmosphere. The V&M Tubes project consists of the continued and enhanced utilization of sustainably produced charcoal for steel manufacture in Brasil, avoiding the use of coal. It was found that the project has the capacity to generate more than 15M tonnes of CO<sub>2</sub> emission reduction equivalents over a 20-year timeframe. V&M has committed more than 5M on these tonnes to the International Finance Corporation and to Toyota Tsusho, a Japanese trading house, at an average price of more than 3 Euros per tonne.

## **Annexes**

Annex 1 – UNCTAD Guide to CDM Projects

Annex 2 – Project Design Document